

Academy of Sciences, and during that time never came in contact with a male. Thus, even though copulation had not occurred, an egg sac was constructed to accommodate infertile eggs.—JOHN T. HJELLE, *California Academy of Sciences, San Francisco*.

High Flight of Butterflies in San Francisco, California.—The purpose of this note is to report observations made by Mr. Russell W. LaBelle, a stock broker, who has an office in the Bank of America building in the Business district of San Francisco. The Bank of America building is San Francisco's highest; 52 stories and 779 feet in height. It is located in the block surrounded by California, Kearny, Pine, Montgomery Streets. From his 43rd story window, which is at an elevation of over 600 feet, on 4 and 5 October 1971, Mr. LaBelle noted butterflies flying in sufficient numbers to warrant telephoning the Academy to report this occurrence. During mid-day a butterfly was seen every few minutes. He observed, from his windows facing on California Street, that the butterflies were flying mostly from west to east. This direction of flight would direct them inland rather than towards the coast.

The species involved in this flight is not definitely known. It was not possible to collect voucher specimens, and an entomologist did not view the flight. It was at first thought that the Monarch, *Danaus plexippus* (Linnaeus) was responsible for this flight. However, from information on extensive flights of the California Tortoise Shell, *Nymphalis californica* (Boisduval) reported in the bay area by Dr. J. Powell at this same time, this latter species may have been involved in this flight.—PAUL H. ARNAUD, JR., *California Academy of Sciences, San Francisco*.

Mass movements of *Nymphalis californica*.—*Nymphalis californica* undergoes periodic or sporadic massive population increases and mass movements which have been called migrations in the literature. The last time this occurred in the San Francisco Bay area was in 1960, when several aggregations of the butterflies were observed in spring, followed by tremendous populations developed in June. During intervening years the species is scarce and may not be a breeding resident here. Data which will be published elsewhere were given concerning movements of the butterflies in the Berkeley Hills during 5–14 October 1971. A request was made for recording of any observations of *Nymphalis*, particularly mass movements, during this fall and next year. Circumstances indicate that the note given earlier in this meeting, on high-flying butterflies over San Francisco, involved observations on *N. californica*.—J. A. POWELL, *University of California, Berkeley*.

Further Observations of Theraphosid Tarantula Burrows.—Two groups of colonies of tarantulas are being observed; one is located at Frank Raines County Park in Stanislaus County, 17 miles west of Patterson. The other is at Los Gatos Creek County Park, Fresno County, 21 miles west of Coalinga. These colony sites have been visited once a month since their discovery over a year ago. Usually the observations have been made during the first weekend of each month.

The Frank Raines Park colonies are on grassy slopes in oak woodlands with a mixture of digger pines, juniper and chamise and are on the north facing slopes. At Los Gatos Park, the area is an almost level grassland with oak-juniper woodlands having a sparse distribution of digger pine and chamise. Both areas have been disturbed by man in the making of the parks, but this apparently has had little effect on the existence of the tarantula colonies.

In late summer and early fall, the tarantula burrow is easy to distinguish because its occupant has woven a collar of webbing around the edge of the opening and

usually has a thin veil of webbing across the entrance. If the veil web is destroyed by inquisitive poking with a twig, the tarantula will usually emerge, examine its doorway and then descend head-first and spin a new veil web. The constant respinning of the veil web builds up the collar around the opening. On several occasions it has been observed that rosettes of dried leaves have been created around the burrow opening, particularly if the hole emerges on a grassless, hard, earth-surface of a campground or picnic area. Late in the summer, some of the tarantulas at Los Gatos Park pushed empty egg cases out of the burrows and left them beside the entrances. Mature females and males usually have a burrow entrance about the size of a 25¢ piece (2.4 cm). However, when the webbing collar is removed, the burrow may be as much as 6 to 7.5 cm in diameter.

With the onset of winter, several tarantulas closed their burrows. It has not been observed how they do this, and there is variation in their techniques. Some plug their burrows at the surface, while others plug the entrance from 2 cm below the surface to 20 to 25 cm below the surface. The veil web and collar are destroyed in the plugging. Sometimes the burrows will develop a growth of grass around the edges or across the plug. Relocation of the burrows is difficult unless they are marked.

What the stimulus for reopening the holes may be has not been determined, nor has the stimulus for plugging the holes been determined. So far there is little indication of correlation between hole-plugging activities and temperature drop. Some tarantulas remained active all winter, even when temperatures at Frank Raines Park dropped to below freezing at night. Others plugged their holes early in the Fall and remained closed through May. Rain doesn't seem to be a direct cause of closure. At Frank Raines Park there was much more rain, yet all occupied burrows observed at Los Gatos Park, were closed this winter and the rainfall there has been extremely sparse this year. In the laboratory "colony" of 13 female and 5 male tarantulas, six females were stimulated to dig holes after an artificial "rainy season" was created by pouring water on them every other day for two weeks. In the field, spiders sometimes plug their burrow entrances after water was poured into the burrow in attempts to wash them out of the tunnel. One female in the laboratory closed her burrow entrance after a "rainstorm" where both the ground and the tarantula were well dampened by water.

The "watering" technique has proved to be a good means of "sexing" colony members. Theraphosid tarantulas usually emerge from the burrow when water is poured into the opening; sometimes half a liter is all that is necessary to bring emergence and at other times it has been necessary to pour over three to five liters into the burrow. This technique saves the need to dig out the tarantula and thus destroy its home. Sometimes, these spiders will plug the entrance with their bodies when water is introduced—the hairy body forming an impenetrable plug. This may be a "defensive" mechanism against sudden flash flooding.

It is unwise to poke fingers into open burrows because the tarantula is often quite aggressive when in the burrow. When teasing spiders out of the entrance with a twig, pencil or similar tool, the tarantula frequently attacks the object with its chelicerae. It has been observed that the spider can sink its fangs into the wood of a pencil. However, once the spider has emerged from its burrow, it then usually assumes the docile attitude of the Theraphosidae.—J. RUSSEL GABEL, *San Francisco State College, San Francisco.*